
**Video snemanje – Format vrste D-11 z magnetnim trakom s širino 12,65 mm –
2. del: Komprimiranje slike in podatkovni tok (IEC 62356-2:2003)**

(istoveten EN 62356-2:2004)

Video recording – 12,65 mm type D-11 format – Part 2: Picture compression and
data stream (IEC 62356-2:2003)

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**Video recording –
12,65 mm type D-11 format
Part 2: Picture compression and data stream
(IEC 62356-2:2003)**

Enregistrement Vidéo –
Format 12,65 mm de type D11
Partie 2: Flux de données et compression
d'image
(CEI 62356-2:2003)

Videoaufnahme –
D-11-Format mit 12,65 mm
Teil 2: Bildkompression und Datenstrom
(IEC 62356-2:2003)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 62356-2:2003, prepared by IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the formal vote and was approved by CENELEC as EN 62356-2 on 2004-09-01 without any modification.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2005-09-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-09-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62356-2:2003 was approved by CENELEC as a European Standard without any modification.

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Annex ZA
(normative)

**Normative references to international publications
with their corresponding European publications**

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE Where an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
SMPTE 292M	1998	BIT-serial digital interface for high-definition television systems	-	-
SMPTE 274M	1998	Television - 1920 x 1080 scanning and analog and parallel digital interfaces for multiple picture rates	-	-
SMPTE RP 211	2000	Implementation of 24P, 25P and 30P segmented frames for 1920 x 1080 production format	-	-
SMPTE 12M	1999	Television, audio and film - Time and control code	-	-
SMPTE RP 188	1999	Transmission of time code and control code in the ancillary data space of a digital television data stream	-	-

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INTERNATIONAL STANDARD

IEC 62356-2

First edition
2003-11

**Video recording –
12,65 mm type D-11 format –**

**Part 2:
Picture compression and data stream**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

VIDEO RECORDING – 12,65 MM TYPE D-11 FORMAT –

Part 2: Picture compression and data stream

FOREWORD

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International Standard IEC 62356-2 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

It was submitted to the national committees for voting under the Fast Track Procedure as the following documents:

CDV	Report on voting
100/630/CDV	100/700/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until 2008-11. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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VIDEO RECORDING – 12,65 MM TYPE D-11 FORMAT –

Part 2: Picture compression and data stream

1 Scope

This International Standard specifies the compression of a high-definition source format to a dual-channel packetized data stream format which is suitable for recording on disc and tape storage devices including the Type D-11 tape recorder. The specification includes a number of basic packetizing operations including the shuffling of the source data prior to compression, both to aid compression performance and to allow error concealment processing in the decoder. The standard also includes the processes required to decode the compressed Type D-11 packetized data format into a high-definition output signal.

This standard supports high-definition source formats using $1\,920 \times 1\,080$ pixels and the sampling structures as specified in SMPTE 274M and RP 211 at the following picture rates:

- 24/1,001/PsF;
- 24/PsF;
- 25/PsF;
- 30/1,001/PsF;
- 50/I;
- 60/1,001/I

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where 'PsF' indicates Progressive segmented Frame and 'I' indicates Interlaced.

The data packet format specified by this standard is used as the source data stream for the associated document which maps this Type D-11 packetized data-stream format together with AES3 data over SDTI.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

SMPTE 292M:1998, *Television – Bit-Serial Digital Interface for High-Definition Television Systems*

SMPTE 274M:1998, *Television – 1920 × 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates*

SMPTE RP 211:2000, *Implementation of 24P, 25P and 30P Segmented Frames for 1920 × 1080 Production Format*

SMPTE 12M:1999, *Television, Audio and Film-Time and Control Code*

SMPTE RP 188:1999, *Transmission of Time Code and Control Code in the Ancillary Data Space of a Digital Television Data Stream*

3 Introduction

This standard specifies the encoding and decoding of high-definition source formats via compression into a bit rate in the range 112~140Mb/s for recording on a Type D-11 digital tape recorder. The recorded bit rate is related to the source picture rate according to Table 1.

Table 1 – Data rates associated with source picture rates

Picture rate	Base data rate Mb/s
24/1,001/PsF	111,863
24/PsF	111,975
25/PsF	116,640
30/1,001/PsF	139,828
50/I	116,640
60/1,001/I	139,828

In common with other compression systems, the Type D-11 encoding process uses intra-frame coding (i.e. the coding is bound by the frame period) using the Discrete Cosine Transform (DCT) to provide the data de-correlation required for efficient compression. The coefficients are quantized and variable length coded (VLC) to produce the basic output data format.

The source pictures are subsampled prior to compression coding. This reduces the number of coded pixels and allows the number of bits-per-pixel value to be raised in proportion. The luminance source sampling grid of 1 920 × 1 080 pixels is reduced to 1 440 × 1 080 pixels. For each chrominance channel, the source sampling grid of 960 × 1 080 pixels is reduced to 480 × 1 080 pixels. In the decoder, the output pixel sample grid is restored back to the source format of 1 920 × 1 080 pixels by interpolation following the compression decoding process.

The compressed data format specified by the output of the compression encoder is of a form which allows direct mapping into the basic block structure as defined in the Type D-11 digital recorder document.

4 Encoding

4.1 Overview

Type D-11 source data for compression shall comprise only the production aperture area as defined by SMPTE 274M.

NOTE DCT coding uses a data block size which allows exactly 1 080 lines to be coded.

The source formats comprise luminance (Y) and chrominance (C_B , C_R) component signals as defined by SMPTE 274M and SMPTE RP 211.

Type D-11 source picture rates for compression shall be constrained to the following values:

- 24/1 001 frames per second in the segmented format as defined by SMPTE RP 211;
- 24 frames per second in the segmented format as defined by SMPTE RP 211;
- 25 frames per second in the segmented format as defined by SMPTE RP 211;
- 30/1 001 frames per second in the segmented format as defined by SMPTE RP 211;
- 50 fields per second in the interlaced format (a.k.a. 50/I) as defined by SMPTE 274M;

- 60/1 001 fields per second in the interlaced format (a.k.a. 60/i) as defined by SMPTE 274M.

The active picture data for compression shall be pre-filtered and then subsampled from a source representation to a subsampled representation.

The reduced active data shall then be split into two identical channels for processing as shown in Figure 1 and Table 2.

The total picture data in each channel shall be divided into 20 250 8*8 blocks, each formed from eight samples of eight consecutive lines in a frame.

The 8*8 blocks for each channel shall then be shuffled within the frame boundary to produce 270 code blocks each comprising 45 luminance (Y) 8*8 blocks and 30 chrominance 8*8 blocks (15C_B and 15 C_R).

The picture data in each code block shall be compressed by the application of the DCT, quantization and VLC encoding. Each code block shall be separately encoded, and there shall be no data-sharing between code blocks. The data from the compression output shall be packed into the code block space of 1 080 bytes.

Each code block shall be segmented into five basic blocks each comprising 216 compressed data bytes. Each basic block nominally contains the compressed data for nine luminance 8*8 blocks and six chrominance 8*8 blocks (3 C_B and 3 C_R). Data overflow from one basic block can be shared with other basic blocks in the same code block.

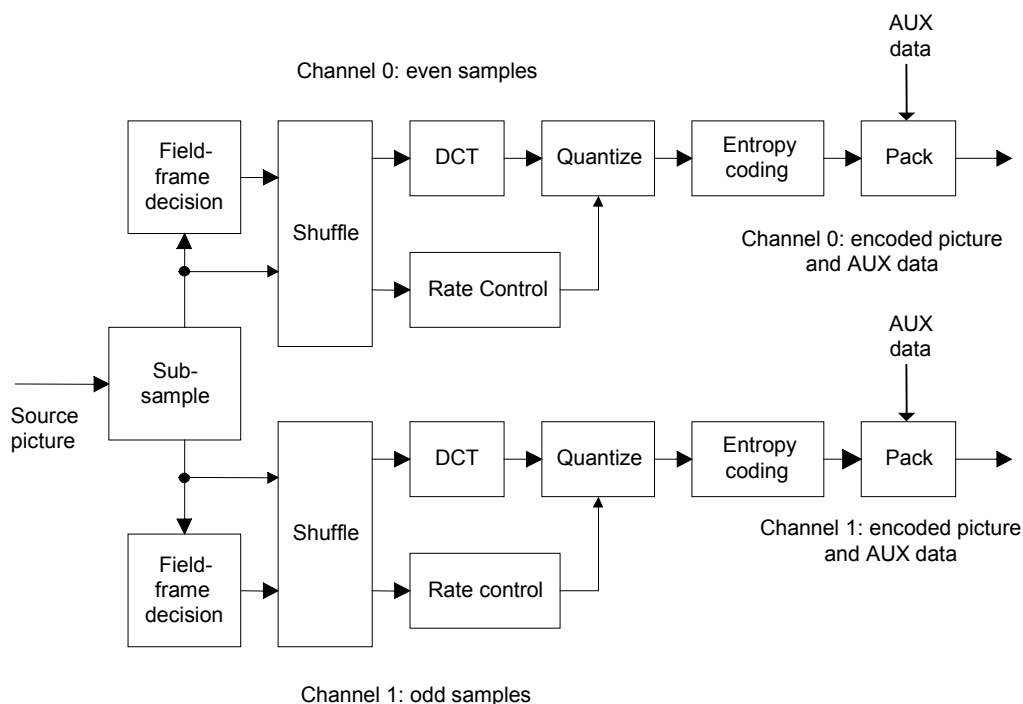
NOTE The 8*8 blocks may be coded by a single 8*8 DCT block, by two 8*4 DCT blocks or by two 4*8 DCT blocks depending on the mode of operation (see 4.4).

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The 270 code blocks for each channel shall be divided into six equal segments of 45 code blocks per segment. Each segment shall contain one auxiliary basic block prior to the compressed data basic blocks. All auxiliary basic blocks in one channel shall be identical with the exception of the segment identification number. The auxiliary basic block shall contain utility data for the segment. The distribution of a channel into code blocks and basic blocks is illustrated in Figure 5.

All basic blocks shall have a total length of 219 bytes. The data for the basic blocks in a code block shall be 216 bytes in length, allowing 3 bytes for the basic block header. The data for the auxiliary basic block in each segment shall be 217 bytes in length, allowing 2 bytes for the basic block header.

NOTE The '*' symbol is used to denote multiplication.



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Figure 1 – Encoding block diagram
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4.2 Pre-processing

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4.2.1 Source picture [standards.iteh.ai/catalog/standards/sist/56e25d5f-ae1f-48b0-b90a-b8df07eed2f8/sist-en-62356-2-2006](#)

The source picture shall be the production aperture as defined in SMPTE 274M having a luminance structure of 1 920*1 080 pixels and a multiplexed chrominance structure of 960*1 080 pixels for each chrominance component.

The source interface has a sample resolution of 10 bits which shall be reduced to 8 bits after the horizontal subsampling process.

4.2.2 Vertical sampling process

For 1 080/I systems, 540 lines for Y , C_B , C_R signals from each interlaced field shall be processed. The coding lines for each interlaced field are illustrated in Figure 2.

For 1 080/PsF systems, 1 080 lines for Y , C_B , C_R signals from each whole frame shall be processed. The coding lines for the segmented frame are illustrated in Figure 2.

4.2.3 Horizontal subsampling process

For the luminance component, all the 1 920 active samples per line shall be subsampled to 1 440 samples per line after a bandwidth limitation filtering process.

For each of the two chrominance components, all the 960 active samples per line shall be subsampled to 480 samples per line after a bandwidth limitation filtering process.

The basic sample parameters for luminance (Y) and the two chrominance signals (C_B , C_R) of the source and sub-sampled component signals are described in Table 2.